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ABSTRACT

This study was performed to assess the effect of field independence/dependence on the successful use of mapping or outlining to take notes from textbooks. Success was measured in terms of student performance on a comprehension test and thoroughness of notetaking. The study sample of 38 students enrolled in reading and study skills courses at a community college in Western Pennsylvania was divided into three groups: a group who received training in mapping/networking, a group who received training in outlining/paraphrasing, and a control group that received no training in notetaking. In the first class session, students were taught either the mapping or outlining procedure and were told to take notes on a passage for homework. Two days later, students evaluated and discussed their homework assignment in small groups. A week later, students were given the Group Embedded Figures Test (GEFT) to assess relative field independence/dependence and were tested on the text material. In the final stage of the process, two raters assessed the thoroughness of the students' notes. Study findings included the following: (1) there were no statistically significant differences between the experimental groups in terms of mean scores on the comprehension test or thoroughness of notes; (2) field-independent students had higher mean test scores using the mapping technique, while field-dependent students had higher scores using outlining; and (3) while there was a significant positive correlation between the GEFT scores of students in the mapping group and their comprehension test scores, there was no similar correlation for students in the outlining group. Based on study findings, teachers were urged to guide students into the notetaking technique best suited to them. (JMC)

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Effect of Field Independence/Dependence on Two Textbook Notetaking Techniques

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Abstract

The effect of field independence and field dependence on the success of mapping and outlining, as determined by performance on a comprehension test and thoroughness of notes, was investigated. Subjects were enrolled in College Reading and Study Skills classes at a community college in Western Pennsylvania. Two way analyses of variances revealed no significant differences in mean scores for the comprehension test and thoroughness of notes for both notetaking groups. However, field-independent students had higher mean test scores using mapping and field-dependent students had higher mean test scores using outlining. The only significant correlation was between GEFT scores for the mapping students and their comprehension test scores. The author concluded that differences must be interpreted cautiously, given that the sample was skewed towards field-dependence. However, outlining might be preferable as a primary notetaking technique taught to similar students. Mapping might be appropriate as an alternative notetaking technique.

Effect of Field Independence/Dependence on Two Textbook Notetaking Techniques

Several researchers have examined various aspects of the role of cognitive style in effective textbook reading, notetaking, and study. By far the most widely-used and studied cognitive style is field independence and field dependence (Keefe, 1979). Witkin et al., (1977) originated the concept of field-independent and dependent learners, and have done much work in demonstrating the influence of this dimension of cognitive style on specific learning tasks. Field-independent learners are defined as being more analytical, active, and structured; whereas, field-dependent learners are more passive, intuitive, and global. There are many implications for these two types of cognitive styles on textbook reading, notetaking, and recall, some of which Annis (1979) addressed when investigating the effect of cognitive style on notetaking, organized and unorganized text passages, and review of low-and high-structural level completion and free recall tests. Among the results was the finding that field-independent students were superior to field-dependent in the completion of sentences of high-structural importance to the meaning of the entire passage, whether the passage was organized or unorganized. The field-independent and field-dependent learners had similar scores on the items of low-structural importance. Furthermore, the field-dependent learners scored better on items of low-structural importance than those of high-structural importance. These findings support the descriptive differences between field-independent and field-dependent learners. At least one learner type, field independent, may be more adept at summarizing information.

Morgan (1981) took a somewhat different approach in his study of learning from a written test. He examined a study technique involving the students' self-assessment and self-monitoring of their own behavioral objectives. One of his hypotheses was that field independents, who have internal frames of

references, would be more likely to benefit from a technique that relies on self-defined goals. As predicted, the field independents were superior to the field dependents when taught a systematic format for reading, notetaking, and studying a text. However, it must be noted that Morgan's study technique was based on the preferred information-processing strategies of field independents, which would qualify the inferior performance of the field dependents.

Likewise, field-independent subjects performed better in a study by Annis and Davis (1978). In this study the authors sought to investigate the effect of the variables of study technique, preference for study technique, review, and cognitive style on a test of recall and recognition. In regards to cognitive style, the results indicated that the field-independent subjects scored better than the field-dependent subjects when using a nonpreferred study technique with no review. There was no other significant difference between the two styles when comparing other study situations, though the field-independent subjects had a tendency to score better than the field-dependent subjects. The field-dependent learners did score higher when using a preferred study technique with no review time, which is a reversal of the pattern of field-independent students scoring higher.

Finally, Smith and Standel's (1981) study most parallels this study's problem statement. The authors sought to compare field-independent and field-dependent learners with the success of training of two textbook notetaking methods, paraphrasing or mapping. They hypothesized that the field independents, who are freer at structuring, would profit more from the paraphrasing training, and the field dependents would benefit more from the visual organization of the mapping. However, the authors' rationalization for this hypothesis could be contradicted. Witkin (1977) describes field independents as perceiving information analytically, that is, the parts of a stimulus are experienced as distinct from the whole. Mapping involves

picking out the main ideas and supporting details from a passage and then organizing them into a visual picture, an act which could be more compatible to the field-independent person. Likewise, Witkin describes field-dependent people as not being able to readily perceive the parts as being separate from the whole, a characteristic which might lead them to do better at paraphrasing a passage.

Smith and Standel also hypothesized that field-independent learners would perform better on the inferential section of the comprehension test. The study's procedure involved 6½ hours of training--15 or 20 minutes, twice a week--in one of the two methods over a ten-week period, using passages from the class texts. All three of the groups were given the Descriptive Tests of Language Skills-Reading Comprehension at the end of the ten-week session. The 15 passages in the 30-minute test were followed by two to four comprehension questions assessing the understanding of main ideas, direct statement, and inferences. The study's dependent variable was the students' comprehension test scores.

Results indicated that neither of the treatment groups, that is, those students who had received the mapping or paraphrasing training, did better than the control group. However, the field independents did significantly better than the field dependents on all of the comprehension test sections. Like the previous findings, this study demonstrated the superior performance of field independents in the comprehension of passages. However, no data from this study signified whether one style benefited more from one study technique than another. It must be noted that the students in the treatment groups who received training in mapping or paraphrasing did not get a chance to use these techniques when their comprehension abilities were assessed. It would seem that the results of this study would be more meaningful if the students were

able to take notes from a passage and then use those notes to study for the comprehension test.

The literature reported here indicates that field independence/dependence may be associated with the effectiveness of textbook reading and study. It would seem logical that field-independent students would be more adept at understanding text material because of their natural preferences and tendencies. However, there is some evidence that study procedures can be adopted to favor the field-dependent students. This study attempts to shed more light on the issue.

Purpose

The purpose of this study was to assess the effect of field independence/dependence on the use of two textbook notetaking techniques, mapping and outlining, as determined by performance on a comprehension test and thoroughness of student notetaking.

Method

Subjects

The subjects consisted of 38 undergraduate students enrolled in one of two suburban campuses of the community college in Western Pennsylvania. Both campuses are similar in size, approximately 13,000 students, and have similar course and program offerings. One mapping treatment group and one outlining treatment group came from each campus. All of the students were enrolled in one of four College Reading and Study Skills classes at the college.

The author determined the initial comparability of the two treatment groups using demographic and academic features. A t-test, at the .05 level, revealed no significant differences between the two groups in reading scores on the Iowa Test of Silent Reading and age. The two groups also appeared comparable according to sex (slightly more males in both) and years in school (predominantly freshmen).

Procedure

Session One (50 minutes). Students were taught either the mapping or outlining notetaking procedure within the context of how to read a text chapter. That is, students were directed to survey a chapter; read, section-by-section; take notes; and, finally, to review. The notetaking techniques were taught and practiced in large group instruction. Students were given a 1550-word text passage, of social science content, to take notes on as a homework assignment for the next session. All reading material was on a ninth-grade readability level.

The same instructional steps were used to teach both the mapping and outlining techniques. The differences in instruction resulted from the differences in format between the two techniques:

Long and others (1978) view mapping, or networking, as consisting of the following processes: selection of important material, identification and understanding of important relationships, and reorganization and re-representation of the material. Mapping was taught as a technique by which the students were to select the main and supporting ideas, identify the relationship among the ideas, and represent this in a concise, graphic form. Long states that there are six basic relationships: "(1) example, (2) characteristic, (3) definition, (4) sequence, (5) result, and (6) compare/contrast" (p. 4). Figure 1 provides an example of mapping.

Insert Figure 1 about here

Outlining is a systematic listing, as phrases of important points from a text passage (see Figure 2). Like mapping, the students were taught to look for the relationships among ideas when outlining a passage.

Insert Figure 2 about here

Session Two (two days later, (30 minutes). In small groups, students evaluated and discussed their homework assignments. Students were directed to

respond to questions concerning: How much time did the assignment take? Was the procedure of surveying, reading, taking notes, and reviewing useful? Do your notes reflect the important points in the text? and How could you use the notes for study? After large group discussion on these questions, the students were given another text passage, similar to the first, to read and take notes on for homework. Guidelines were issued:

1. Follow the procedure learned in class.
2. Your notes are to be a study aid in remembering important ideas in the text passage.
3. Spend no more than one hour on the assignment.
4. During the next class session, your notes will be used for study before taking a comprehension quiz.

Session Three (one week later, 50 minutes). The Group Embedded Figures Test (GEFT) was administered to the students in order to assess relative field independence and field dependence. Students' notes were then returned to them for ten minutes of individual review. After the notes were collected, a short quiz covering the text material was administered to students.

The 16-question quiz consisted of 15 multiple-choice and one free response question, chosen for their relevance to the notetaking skills emphasized during instruction, recognition of main ideas, supporting ideas, and relationship of ideas. The sixteen questions seemed to favor neither notetaking group.

In addition, three questions were written on the board for the students to answer. The questions were added in order to obtain further information regarding any differences in the students' use of the two notetaking techniques. The questions were as follows:

17. Did you like the form of notetaking you used for this passage?
18. Did you use any other technique of notetaking for this passage?
19. How much time did it take you to read and take notes on this passage?

Rating Thoroughness of Notes: Two raters determined the thoroughness of the students' notes by designing a predetermined scale reflecting the notetaking skills taught and practiced during the instructional sessions. The three criteria examined were:

1. Do the notes include the main idea of the passage?
2. Do the notes include pertinent details of the passage?
3. Do the notes represent the organization of the passage?

Using their individual notes as models, the raters determined what guidelines to use when scoring the three criteria. Scores ranged from "3" indicating "good" to "0" indicating "no credit."

After the third instructional session was completed by all the notetaking groups, the two raters met to score all 38 sets of notes, 18 mapping and 20 outlining. Each rater individually gave each student's notes a score from zero to three for each criterion.

If a disagreement arose between the two raters, the notes in question were looked at by the raters together. A consensus was then reached. Of the total 114 scores (three for each of the 38 sets of notes) only 10, or 8.8% needed to be reviewed by both raters. It was usually found that one of the raters made an error in counting the number of ideas presented in the notes. Agreement was quickly reached between the raters.

Results

As Witkin et al., (1977) point out, the classification of field independence/dependence is relative to the sample one is working with. In other words, one must determine who is field independent or field dependent according to the range of scores for each group of people.

The norming group for the Group Embedded Figures Test (GEFT) was used as the reference point for analyzing the scores of the students in this study.

The norming group for the GEFT consisted of undergraduate students from a four-year, eastern, liberal arts college.

The possible range of scores for the GEFT was from 0 to 18, with the lower end representing field dependence and the higher end representing field independence. There were 17, rather than 18, students in the mapping group because one student did not complete the GEFT.

Insert Table 1 about here

According to the data in Table 1, the mean GEFT scores for the students in both notetaking groups is lower than the GEFT scores for the college-aged students in the norming group. While the means for the norming group lie between 10 and 12, the means for the notetaking groups lie between 6 and 8. In other words, the students in both notetaking groups were more field dependent than were the students used in the normative data for the GEFT (Witkin et al., 1977).

In addition, the students in this study were classified as being field independent/dependent according to the total distribution of GEFT scores for each sex (Annis, 1979; Witkin et al., 1971). Of the 37 students who took the GEFT, the upper one-third were considered field independent according to each sex (Annis, 1979; Smith & Standel, 1981). The author designated the three females who scored between 10 and 13 as being field independent. The seven males who scored between 10 and 16 were field independent. Likewise, the six females who scored between 0 and 4 were field dependent, as were the seven males who scored between 0 and 2. The scores of the 14 students who scored in the middle one-third were not used.

The first research question was as follows: Is there a significant difference in the mean comprehension test scores for the mapping and outlining treatment groups according to the students' classification of either Field Dependent (FD) or Field Independent (FI)? In other words, are students

classified as being either Field Dependent or Field Independent more successful in the use of either the mapping or outlining techniques, as measured by their performance on a comprehension test?

Table 2 presents means and standard deviations of the comprehension test scores for those students classified as field independent and field dependent. The possible range of test scores was 0 to 20.

Insert Table 2 about here

In order to test the hypothesis of interest, a two-way analysis of variance (ANOVA) was done on the comprehension test scores. Table 3 presents the results of this test.

Insert Table 3 about here

There was no significant difference in mean comprehension test scores for students in the two notetaking techniques. However, the F rating was significant at the .01 level for the interaction of notetaking technique and field-independence/dependence dimension. In order to interpret the significant interaction, Figure 3 presents the means for the field-independent and field-dependent students under the two techniques.

Insert Figure 3 about here

Figure 3 indicates that, whereas the field-independent students had higher mean comprehension test scores than the field-dependent students using the mapping technique, the field-dependent students had higher mean comprehension test scores using the outlining technique. Therefore, there is some evidence that field-independent students perform better at mapping and field-dependent students perform better at outlining.

The next research question asked: Is there a significant difference in the mean scores representing the thoroughness of notes, as measured by a predetermined scale, for the mapping and outlining groups according to the

classifications of Field Dependent (FD) and Field Independent (FI)? In other words, do the mapping notes differ significantly from the outlining notes for those students classified as being either Field Dependent or Field Independent?

Table 4 presents the means and standard deviations of the scores representing thoroughness of notetaking for those students classified as field independent and field dependent. The possible range of scores for thoroughness of notes was 0 to 9.

Insert Table 4 about here

In order to test the hypothesis of interest, a two-way analysis of variance (ANOVA) was done on the scores representing the thoroughness of notes. Table 5 presents the results of this test.

Insert Table 5 about here

None of the F ratios was significant at the .05 level; therefore, there was no significant difference in mean scores representing the thoroughness of notes and there was no significant interaction between technique and dimension. This does not support the previous finding that field-independent students perform better at mapping and field-dependent students perform better at outlining.

As was noted in Table 1, this sample of students was more field dependent than was the norming population for the GEFT. Because of the skewed distribution of students towards the lower scores on the GEFT, as well as the relatively small number of students classified as field dependent and field independent (Table 1), the author decided that it would be helpful to examine the correlation of GEFT scores for all the students with their corresponding test and notes scores.

The author answered the following additional research questions:

a. Within each notetaking group, mapping and outlining, what is the

relationship between the comprehension test score and the score on the Group Embedded Figures Test?

b. Within each notetaking group, mapping and outlining, what is the relationship between the score representing the thoroughness of notetaking and the score on the Group Embedded Figures Test?

As is indicated in Table 6, there is a significant correlation between GEFT scores of students in the mapping group and comprehension test scores. In other words, the higher the comprehension test scores of the mapping students, the higher their corresponding GEFT scores. This relationship is not

Insert Table 6 about here

indicated for the correlation of GEFT scores and test scores in the outlining group. There is no significant relationship indicated between GEFT scores and the thoroughness of notetaking scores for either the mapping or outlining group.

The significant correlation indicated in Table 6 supports the significant interaction between notetaking technique and field-independence/dependence dimension (Table 3). As shown in Figure 3, there was a greater difference in mean test scores for the field-independent learner than there was for the field-dependent learner. The student classified as being field independent, that is, having a higher GEFT score, also scored higher on the comprehension test, as correlated in Table 6.

Discussion

The interaction of notetaking technique and field-independence/dependence dimension did show a significant difference in the students' mean comprehension test scores. However, this result must be interpreted cautiously because the sample, one-third of which was not used in the classification of field independence/dependence, was skewed towards the lower range of GEFT

scores. This finding, along with the students' reactions to the notetaking, as determined by test questions 17 through 19, have implications for educators faced with the choice of which notetaking technique would be most valuable to teach to their students.

It was the experience of the author that outlining was somewhat easier to teach than was mapping. During instruction, fewer questions were asked by the outlining classes. More variations in mapping a passage are possible which seemed to complicate instruction and discussion. Furthermore, most of the outlining students were already familiar with that type of notetaking. Usually, college students have had some past experience with the outlining format, which is not true with the mapping format. This previous experience might explain why a higher percentage of the outlining students liked their form of notetaking (73% v.s. 59%). Also, on the average, the outlining took less time for the students than did the mapping (46 minutes v.s. 61 minutes). In addition, the field-dependent students did perform better at the outlining technique. Since the students as a whole tended to be field-dependent, outlining might be a preferable notetaking technique for similar community college students. Therefore, since outlining is favored by more students, takes less time, and generally shows similar test and note scores except for the classification of field-independence/dependence, it might be preferable as a primary notetaking technique taught to undergraduate community college students.

However, the author is not suggesting that mapping be eliminated in the instruction of textbook notetaking. It was evidenced that certain students do perform significantly better when using mapping notes and; therefore, mapping should be included as a notetaking choice for students. The author recommends that mapping be taught as an alternative notetaking technique to community college students.

The evidence generated in this study is not strong enough to warrant matching cognitive style with the instruction of textbook notetaking. Instead, the instructor should be aware of which notetaking technique has the highest probability of being successful with certain students. For example, the student classified as being field independent is likely to perform better using the mapping technique. It is the responsibility of the instructor to guide students into practicing notetaking techniques which will be the most successful for them.

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Table 1

Means and Standard Deviations of GEFT Scores for Notetaking Groups and Norming Group According to Sex

	MALE			FEMALE		
Group	(N)	M	SD	(N)	M	SD
Mapping	(9)	7.00	5.81	(8)	6.13	3.31
Outlining	(12)	6.08	4.25	(8)	7.63	3.54
Norms	(155)	12.00	4.10	(242)	10.80	4.20

Table 2

Means and Standard Deviations of Comprehension Test Scores for Notetaking Groups According to Field-Independence/Dependence

	FI			FD		Average	
Group	(N)	M	SD	(N)	M	SD	M	SD
Mapping	(6)	11.83	1.47	(7)	9.00	1.63	10.42	2.00
Outlining	(4)	7.75	2.06	(6)	10.33	3.01	9.04	1.82
Average	(10)	9.79	2.88	(13)	9.67	0.94		

Table 3

ANOVA Summary Table for Comprehension Test Scores

Source	df	MS	F	Significance
Notetaking Technique	1	10.41	2.33	no
FI/D Dim.	1	0.09	0.02	no
Tech. x Dim.	1	40.40	9.84	yes
Error	19	4.47		

Table 4

Means and Standard Deviations of Scores Representing Thoroughness of Notes for Notetaking Groups According to Field Independence/Dependence

	FI			FD			Average	
Group	(N)	M	SD	(N)	M	SD	M	SD
Mapping	(6)	6.50	1.38	(7)	5.29	0.95	5.90	0.86
Outlining	(4)	5.50	1.00	(6)	5.67	0.82	5.59	0.12
Average	(10)	6.00	0.71	(13)	5.48	0.27		

Table 5
ANOVA Summary Table for Thoroughness of Notes Scores

Source	df	MS	F	Significance
Notetaking Technique	1	0.34	0.30	no
FI/D Dim.	1	2.30	2.05	no
Tech. x Dim.	1	2.53	2.26	no
Error	19	1.12		

Table 6

Correlations of GEFT Scores with Comprehension Test Scores and Thoroughness of Notes Scores

Group	N	GEFT with comprehension scores	GEFT with thoroughness scores
Mapping	17	.61*	.35
Outlining	20	-.32	-.03

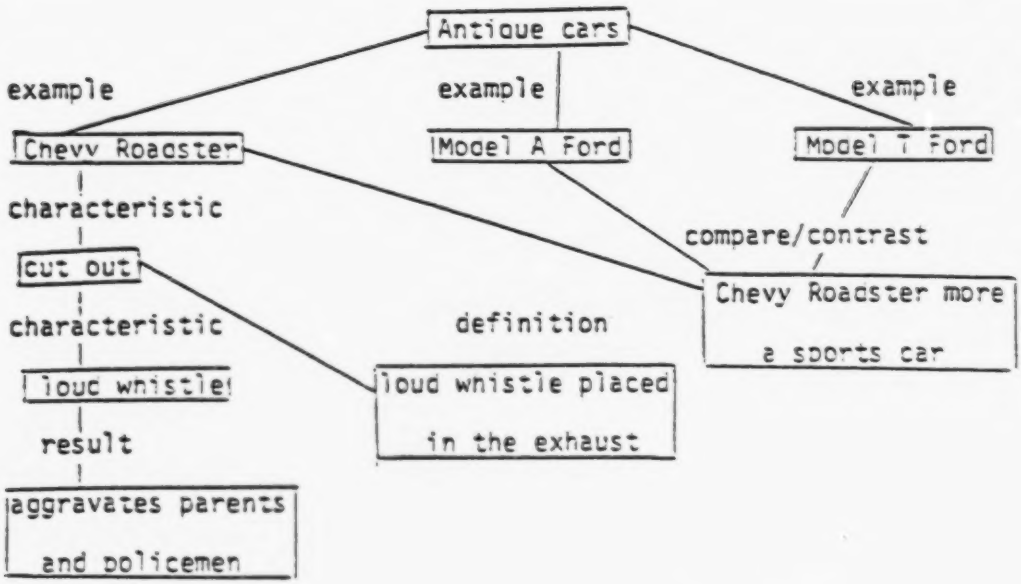
*$p < .01$

Figure Captions

Figure 1. Example of Mapping (adapted from Long, 1978, p.5).

Figure 2. Example of Outlining.

Figure 3. Interaction Graph for Notetaking Technique x FI/D Dimension.


Antique cars
example
example
example
Chevy Roadster
Model A Ford
Model T Ford
characteristic
compare/contrast
cut out
Chevy Roadster more
a sports car
characteristic
definition
loud whistle
loud whistle placed
in the exhaust
result
aggravates parents
and policemen

Antique Cars

Example: I. Chevy Roadster

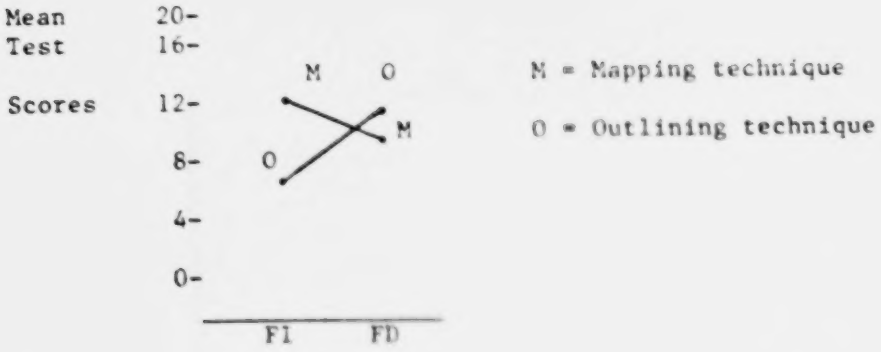
Characteristic A. has a cut out

Definition: 1. is a loud whistle placed in the exhaust system
2. aggravates parents and policemen

Characteristic B. is more a sports car than the Model A or Model T Ford

Example: II. Model A Ford

Example: III. Model T Ford



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